AEROSPACE
MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 2269A

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CHEMICAL CHECK ANALYSIS LIMITS
Wrought Nickel and Nickel Base Alloys

1. PURPOSE: To publish standard chemical check analysis limits as established by AMS usage and to correlate their application and use with material specifications.

2. APPLICATION: The chemical check analysis limits shown herein shall apply when referenced in the material specification, unless otherwise agreed upon by purchaser and vendor. Check limits not listed herein shall be as agreed upon by purchaser and vendor.

3. DEFINITIONS:

3.1 Check Analysis: An analysis made by purchaser or vendor of the metal after it has been worked into semi-finished or finished forms or fabricated into parts, and is either for the purpose of verifying the composition of a heat or lot or to determine variations in the composition within a heat. Acceptance or rejection of a heat or lot of material or batch of parts may be made by the purchaser on the basis of this check analysis.

3.2 Variation Limit, Under Min or Over Max: Given in Section 6 is the amount an individual determination for a specified element may vary under or over the specified composition limit. In no case shall the several determinations of any element in a heat, using the same analytical procedure, vary both above and below the specified range. These variations are not permitted for ladle or ingot analyses made by the producer.

3.3 Remainder: Shows the basis element from which the alloy is made and is assumed to be present in an amount approximately equal to the difference between 100% and the sum percentage of the alloying elements and listed impurities. It need not be analyzed nor need a percentage figure be reported.

3.4 Other Impurities (Elements), Each, Max: The maximum amount of an individual element not mentioned specifically in the composition section that may be present. Producer normally will analyze only for impurities which are possible to be present because of raw materials or manufacturing processes and which may affect the product significantly. Others will analyze for impurities as they deem necessary.

3.5 Other Impurities (Elements), Total, Max: The sum percentage of the impurities (elements) (See 3.4) found. It is not inferred by this statement that an analysis need be made for each element of the periodic table not mentioned specifically in the composition section.

4. SAMPLING: For the purpose of determining conformance to the material specification composition requirement, each heat in the shipment shall be considered separately. All samples shall be taken from material in the condition in which it is received, except that all protective surface treatments shall be removed before sampling finished parts. Drillings or chips shall be taken without the application of water, oil, or other lubricants, and in such a manner as to prevent alteration of the chemical composition of the sample, and shall be free from scale, grease, dirt, and other foreign materials. Sampling shall be in accordance with the issue of ASTM E59 listed in the latest issue of AMS 2350, insofar as practicable.

5. ANALYTICAL PROCEDURES: Referee methods of analysis shall be the latest edition of the ASTM Book of Standards, part titled "Methods of Chemical Analyses of Metals" or methods approved by the National Bureau of Standards. Procedures for elements not covered shall be as agreed upon by purchaser and vendor.

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6. CHECK LIMITS:

Element	Limit or Maximum of Specified Element, %	Variation Under Min or Over Max
Carbon	Up to 0.02, incl	0.005
	Over 0.02 to 0.20, incl	0.01
	Over 0.20 to 0.60, incl	0.02
	Over 0.60 to 1.00, incl	0.03
Manganese	Up to 1.00, incl	0.03
	Over 1.00 to 3.00, incl	0.04
	Over 3.00 to 6.00, incl	0.07
Silicon	Up to 0.05, incl	0.01
	Over 0.05 to 0.25, incl	0.02
	Over 0.25 to 0.50, incl	0.03
	Over 0.50 to 1.00, incl	0.05
	Over 1.00 to 4.50, incl	0.10
Phosphorus	All	0.005
Sulfur	Up to 0.02, incl	0.003
	Over 0.02 to 0.060, incl	0.005
Chromium	Over 3.00 to 5.00, incl	0.10
	Over 5.00 to 15.00, incl	0.15
	Over 15.00 to 25.00, incl	0.25
	Over 25.00 to 35.00, incl	0.30
Nickel	Over 20.00 to 30.00, incl	0.25
	Over 30.00 to 40.00, incl	0.30
	Over 40.00 to 60.00, incl	0.35
	Over 60.00 to 80.00, incl	0.45
	Over 80.00 to 99.00, incl	0.60
Cobalt	Up to 0.10, incl	0.01
	Over 0.10 to 0.20, incl	0.02
	Over 0.20 to 1.00, incl	0.03
	Over 1.00 to 5.00, incl	0.05
	Over 5.00 to 10.00, incl	0.10
	Over 10.00 to 15.00, incl	0.15
	Over 15.00 to 20.00, incl	0.20
	Over 20.00 to 25.00, incl	0.25
	Over 25.00 to 30.00, incl	0.30
	Over 30.00 to 35.00, incl	0.35
Molybdenum	Over 0.20 to 1.00, incl	0.03
	Over 1.00 to 3.00, incl	0.05
	Over 3.00 to 5.00, incl	0.10
	Over 5.00 to 20.00, incl	0.15
Tungsten	Up to 1.00, incl	0.04
	Over 1.00 to 3.00, incl	0.10
	Over 3.00 to 5.00, incl	0.15

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